Bring Fuel Cells into Your Course with Modules

CACHE Fuel Cell Task Force

Jason Keith (Michigan Technological University)
Mike Gross (Bucknell University)
Don Chmielewski (Illinois Institute of Technology)
H. Scott Fogler (University of Michigan)

For the past few years, a CACHE task force has been developing modules to introduce concepts of hydrogen and hydrogen fuel cells into the chemical engineering undergraduate curriculum. To date, about two dozen modules have been developed for the following ChE courses:

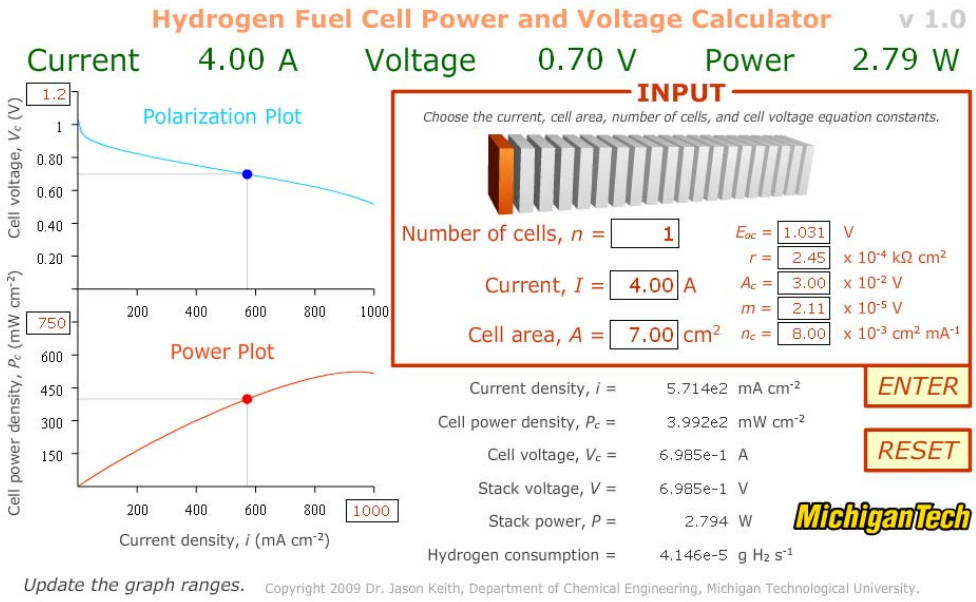
- Material and Energy Balances
- Thermodynamics
- Fluid Mechanics
- Heat and Mass Transport
- Kinetics and Reaction Engineering
- Separations

Each module contains a background on the technology as it applies to the core course. This is followed by an example problem statement and a solution to the example problems. Finally, a homework problem is provided. Homework solutions are available on a password protected website. Instructors can distrubute the modules "as is" for homework, or give the background information and example problem as an in-class problem.

The modules are available at the following website: http://www.chem.mtu.edu/~jmkeith/fuel_cell_curriculum or the shorter URL http://tinyurl.com/fuelcellcurr

The interactive *"Fuel Cell Power and Voltage Calculator"* has input boxes to enter and/or adjust the number of cells, stack current, and fuel cell cross-sectional area. A screenshot is shown in the image on the next page. As the parameters are adjusted, a point moves along a polarization plot and power density plot. Furthermore, key parameters are to be calculated including voltage, power, and hydrogen consumption rate. This allows a student to learn about the important parameters in fuel cell design and operation.

For any questions, comments, or ideas for new modules, please contact fuel cell task force chair Jason Keith at jmkeith@mtu.edu.



http://www.chem.mtu.edu/~jmkeith/fuelcellcalculator/H2FuelCellPVCalculator.swf